5.8 Pipeline Hazard

A major pipeline hazard event has been determined to have a **Low** likelihood of occurrence in Benton County within the five-year planning cycle of this Plan. Therefore, although some hazard characterization information is presented below, no further risk assessment has been performed for this hazard. Additional analyses to further characterize the risks of this hazard and the development of suitable mitigation action items will be conducted in the future based on periodic reviews of this hazard mitigation plan and available resources

5.8.1 Nature of the Hazard

Pipelines, typically buried underground, are used to carry water, wastewater, and a variety of gases and liquids, many of which are hazardous. The primary concerns within this section are those pipelines carrying natural gas, petroleum products, and other hazardous materials. A serious release of hazardous materials from a pipeline can adversely affect human health and the environment, and potentially have catastrophic consequences.

Pipeline systems have three primary components: the primary transmission line, a local distribution network of progressively smaller pipelines, and the control facilities (compressor and pump stations, valves, meters, etc.). Pipelines are buried within a right-of-way. Major transmission lines run for miles across country, passing through remote, sparsely populated areas as well as urban centers. Local distribution lines are more commonly found within urban or industrial areas, beneath buildings, streets, sidewalks, and houses.

Historical Events

In 1999, a failure in the Olympic gasoline pipeline in Bellingham, Washington, released several thousand barrels of gasoline into Whatcom Falls Park. The gasoline ignited, killing three people, injuring eight, and causing significant environmental damage to Whatcom and Hannah creeks.

The U.S. Department of Transportation, Office of Pipeline Safety tracks incidents nationwide for pipeline operators. In 2002, natural gas transmission operators experienced 81 reportable incidents, with one fatality, five injuries, and $24,365,559 in property damages. Average property damage from a single incident in 2002 was $300,809 for natural gas transmission lines. Fifty-three percent of the transmission line failures were due to failure of the pipeline and/or control/relief equipment (e.g., corrosion, malfunction, weld/joint failure, etc.). Eighteen percent of the failures were due to excavation accidents. Only six percent of the transmission line failures were due to floods, and one percent due to high winds.

In the same year, local distribution systems for natural gas experienced 102 incidents, causing nine fatalities, and $23,607,604 in property damage. Average property damage from a single incident in 2002 was $231,447. Of the 102 incidents, 57 were reported caused by “outside forces.” Outside forces are defined as a natural force or accident, such as excavation by a third-party, outside the control of the operator. Nine incidents were reported caused by the operator, six were reported caused by operating error, one by corrosion, and twenty-nine were indeterminate as to cause.

Operators of hazardous liquid pipelines reported 143 accidents with one fatality, no injuries, and $33,650,034 in property damages for 2002. Property damages averaged $235,314 for a single incident involving hazardous liquid pipelines.

Characteristics of the Hazard

There are interstate transmission pipelines that pass through or within one mile of Kennewick, Richland, and Prosser, as well as unincorporated parts of Benton County.

Benton County has two interstate natural gas transmission pipelines: Pacific Gas and Transmission Company (PGT) and Northwest Pipeline Company. The PGT line crosses the southeast corner of the county as it extends from Walla Walla County, into Oregon. The Northwest Pipeline Corporation line runs up the Columbia River Gorge from Vancouver to Plymouth. There it branches into two lines, one to the Yakima Valley and Wenatchee, the other serves the Tri-Cities and Spokane. The system distributes natural gas to Washington's seven utility companies. The maximum pipe size is 30 inches. Gas energy from this distribution system directly serves the Plymouth and south Finley area industrial land use designations. Substantial undeveloped industrial designated lands exist within these two areas.

In its pure state, natural gas is colorless and odorless, and is not toxic. In confined spaces, however, natural gas can be an asphyxiant if it displaces oxygen. Natural gas burns readily when ignited at concentrations between 4 and 15 percent in air.

The strong odor associated with natural gas actually comes from a substance mixed with natural gas in low concentrations to serve as a warning of the presence of natural gas. The substance is generally added at the local distribution level by local gas utilities. Natural gas in interstate transmission lines is generally not odorized. Natural gas leaks in transmission lines are most indicated by a loss in pressure, or by other evidence at the site of the leak, including:

- A blowing or hissing sound
- Dirt being blown in the air
- Bubbles or water being blown in the air (where the pipeline crosses a pond or waterway)
- Fire apparently coming from the ground or burning above the ground
- Vegetation turning brown on or near the pipeline right-of-way

Fires and/or explosions from natural gas leaks in transmission pipelines are rare, but can be substantial. Natural gas is approximately 1/3 the density of air. Leaking natural gas therefore does not typically accumulate near the ground, but rises rapidly and becomes diluted in the air. Fires and/or explosions associated with natural gas leaks are generally in buildings where the confined space allows leaking gas to accumulate until ignited.

Interstate gas transmission lines are generally constructed of welded steel pipe for both strength and flexibility. Major failures of such pipelines are rare, but can occur from both natural and man-made causes. Natural causes of pipeline failure are landslides and earthquakes. Soft sloping ground near waterway crossings can be susceptible to liquification and/or lateral spreading, causing significant pipe displacement and rupture.

The most common man-made cause of pipeline failures is accidental rupture by excavation equipment during construction projects. Most such accidents occur with local distribution lines. Pipelines are also potential targets for terrorism. Major pipeline breaks could disrupt service over a wide region with significant economic impacts.

Local natural gas distribution lines consist of an interconnected system of mains and progressively smaller distribution lines taking natural gas to each city, neighborhood, block and building, and appliance served. The distribution lines almost always follow the established utility rights of way along road and street patterns, and because of the need to connect to each building served. The distribution lines are subject to failure by both natural and man-made causes, with most ruptures due to accidents during excavation.

Chevron Pipeline Company operates a petroleum products pipeline, carrying gasoline, diesel fuel, and jet fuel from Salt Lake City to a terminal in East Pasco, across the Columbia River from Kennewick. The terminal consists of twenty aboveground storage tanks with rail, truck, and barge access.

5.8.2 Hazard Assessment

Hazard Identification

TBD

Vulnerability Assessment

TBD

Risk Analysis

TBD

5.8.3 Community Concerns

TBD

Current Conditions

In April 2000, the Office of Pipeline Safety and the Washington Utilities and Transportation Commission (WUTC) completed a joint review of interstate transmission pipeline facilities in Washington. The WUTC also conducted a review of the intrastate pipelines carrying natural gas and hazardous liquids. The reviews were focused on factors critical to pipeline safety and environmental protection, and included operator compliance with Federal pipeline safety requirements, operator programs/activities to ensure pipeline integrity, and issues that emerged from the Bellingham accident investigation. A key concern during the reviews was operator use of internal inspection and hydrostatic pressure testing to directly assess pipeline condition and integrity. Results of this review for pipeline operators in Benton County are depicted in Table 5.8-1 below.

Table 5.8-1. System Integrity Tests on Interstate Pipeline Systems in Benton County*				
Operator	% system internally inspected	In-line inspection tool type	Internal Inspection	% system hydro-tested 1990 to 2000
Chevron Pipe Line Co.	89	Hi-Res. MFL	1996 - 1999	0
PG&E Gas Transmission	12	MFL	1996	1
Northwest Pipe Line (Williams Gas – West)	17	MFL & Geometry	1996 - 1999	11

*Some segments were both internally inspected and hydrostatically tested.

The WUTC noted a potential concern in the lack of system-wide periodic integrity assessments, whether internal inspections or hydro-testing.

Ongoing Mitigation

TBD

5.8.4 Mitigation Strategies

Specific mitigation action strategies and/or potential mitigation measures have not been determined.

Possible broad mitigation strategies include:

a. Enhancing public education and awareness programs regarding pipeline hazards and the care that must be exercised in their vicinity.

b. Improved communication and information sharing between the operators and local government agencies, particularly those involved with land use planning and emergency response.

c. Enhanced operator support and cooperation with emergency first responders.

d. Enhanced operator programs and management systems for assuring pipeline system integrity, including consideration of nearby population and environmentally sensitive areas in making integrity management decisions.

5.8.5 Resources

State Resources

Washington Utilities and Transportation Commission

Federal Resources

U.S. Department of Transportation
Research and Special Programs Administration
Office of Pipeline Safety

Other Resources